



# **“WinFS” Future Directions: An Overview**

**PDC<sup>05</sup>**  
DEVELOPER POWERED

Shishir Mehrotra

DAT209

WinFS Product Planning

Microsoft Corporation

# VIDEO



**WinFS**

**PDC<sup>05</sup>**  
DEVELOPER POWERED

The new relational filesystem for  
Windows

# Agenda

- History and Updates
  - What's integrated storage?
  - What's happened to WinFS since the last PDC?
- Introducing WinFS
  - Why WinFS?
  - What is WinFS?
- Value of WinFS
  - What can applications do with WinFS?
  - What does “Unify, Organize, Explore, Innovate” really mean?



# History and Updates

**PDC<sub>05</sub>**  
DEVELOPER POWERED

What's integrated storage?

What's happened to WinFS since the last PDC?

# History

How did we get here?

- Integrated Storage a priority at Microsoft
  - Vision: Single store for all data
  - Some visible and not visible projects over the last many years
- Today's world more ready
  - Digitally-born data
  - Relating data
  - More supporting technology

# Updates

## Changes to WinFS since the last PDC

- Delivery
  - Out of band from main Windows Vista release
  - Delivered as Windows component with subsequent version of WinFX Runtime Components
- Timeframe
  - More betas, first beta now
- Alignment with rest of Microsoft data stack
  - ADO.NET: Single data access API
- Platform support
  - Beta 1 support for Windows XP SP2

A series of overlapping, curved lines in shades of pink, blue, and yellow, creating a dynamic, abstract graphic on the left side of the slide.

# Introducing WinFS

**PDC<sup>05</sup>**  
DEVELOPER POWERED

Why WinFS?  
What is WinFS?

# WinFS Value Propositions

## Unify

- Enabling richer data types to cover all the user's data
- Beyond islands of data and the data partitioning cycle

## Organize

- Folders aren't enough, organize information how you think about it
- Modeling richer information models

## Explore

- Move beyond tagging and searching
- Leverage the strength of query processor
- Model data naturally, leverage data organization across apps

## Innovate

- A Windows desktop data platform that apps can use directly
- Built for today's smart connected client scenarios



# What is WinFS?

## ADO.NET



## WinFS

### Services

#### Sync

Adapters, ...

#### Operations

Backup, AV, ...

#### File Services

Metadata Handlers, ...

### Schemas

#### People

#### Mail

#### Tasks

#### Media

#### Docs

...

### Item Data Model

#### Item

#### Association

#### Extension

#### Database Engine

#### NTFS

#### CLR

- **Unified API**

ADO.NET entities support – query, update, app logic, language integrated query, ...

- **It's Still a File System**

FS Semantics, Security, Manageability, Backwards Compatible with Win32

- **Operations**

Backup/Restore, AV, ...

- **Sync**

Multi-master Sync

- **New Windows Types**

“Everyday info” schemas + ISV extensions

- **Structured “Item” Store**

Files & Folders → Items & Associations

- **Integrated storage components**

Leverage investments in DB Engine



# The Value of WinFS

**PDC<sup>05</sup>**  
DEVELOPER POWERED

What can applications do with WinFS?  
What does “Unify, Organize, Explore, Innovate” really mean?

# Meet Our Real Estate Agent...

The collage features several overlapping browser windows and a mobile phone. Key elements include:

- Microsoft Internet Explorer - Coldwell Banker Bain:** Displays search results for properties in the Central Area of Seattle, WA. The results show a property at 2508 S KING ST B with 3 bedrooms, 2 bathrooms, and a price of \$270,000.
- Microsoft Internet Explorer - Windermere Real Estate:** Shows a search complete page with 172 properties returned. It includes links to a photo gallery, 360° virtual tour, and a premier property.
- Microsoft Internet Explorer - Evite:** Displays an event invitation for a Harry Potter book launch event, featuring a pre-order for Harry Potter Book 6.
- Microsoft Internet Explorer - Northwest Multiple Listing Service:** Shows a search for properties with filters for minimum price, maximum price, bedrooms, and bathrooms.
- Mobile Phone:** A black smartphone is shown in the center, displaying a green screen with a white text box.

**Enter NWMLS & WinFS...**

**Northwest Multiple Listing Service**

**Search Results**

429 Listings Match Your Search Page 60 of 72

**Save This Search** **New Search** **Modify Search**

Sort List By Price, Highest First

**View Details**

**Home Comparison**

Click on the Compare Property link to add a property to the comparison list

**Minimum Price** No Min

**Maximum Price** No Max

**Bedrooms** ALL

**Bathrooms** ALL

**View Details**

**Search Complete**

Your search returned 172 properties

**Photo Gallery** **360° Virtual Tour**

**Builder Gallery** **Premier Property**

**Year Built:** 1963

**MLS#:** 25098105

**Square Feet:** 2,240

**Lot Size:** 13505.00 SQFT

**Agent:** Rebecca Hanson

**Office:** Windermere Real Estate / Seattle-Oak Trap

**Surprise 30th B'day Party 9 NEW RSVP(s)**

**Attending - Delete**

A series of overlapping, curved lines in shades of pink, blue, and yellow, originating from the left side of the slide and extending towards the center.

DEMO

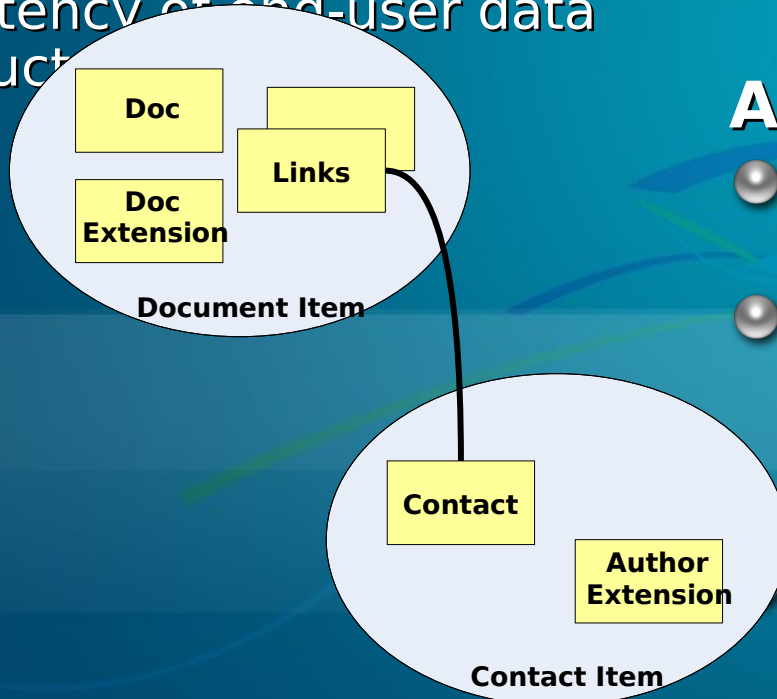
# Value of WinFS: UNIFY

**PDC<sup>05</sup>**  
DEVELOPER POWERED

# WinFS “Item Data Model”

## Design points

- Model richer set of end-user data
- Enrich organization facilities for users
- Consistency of end-user data constructs



## Items

- The new atomic unit of data
- Subsume Files
- Center of user operations

## Associations

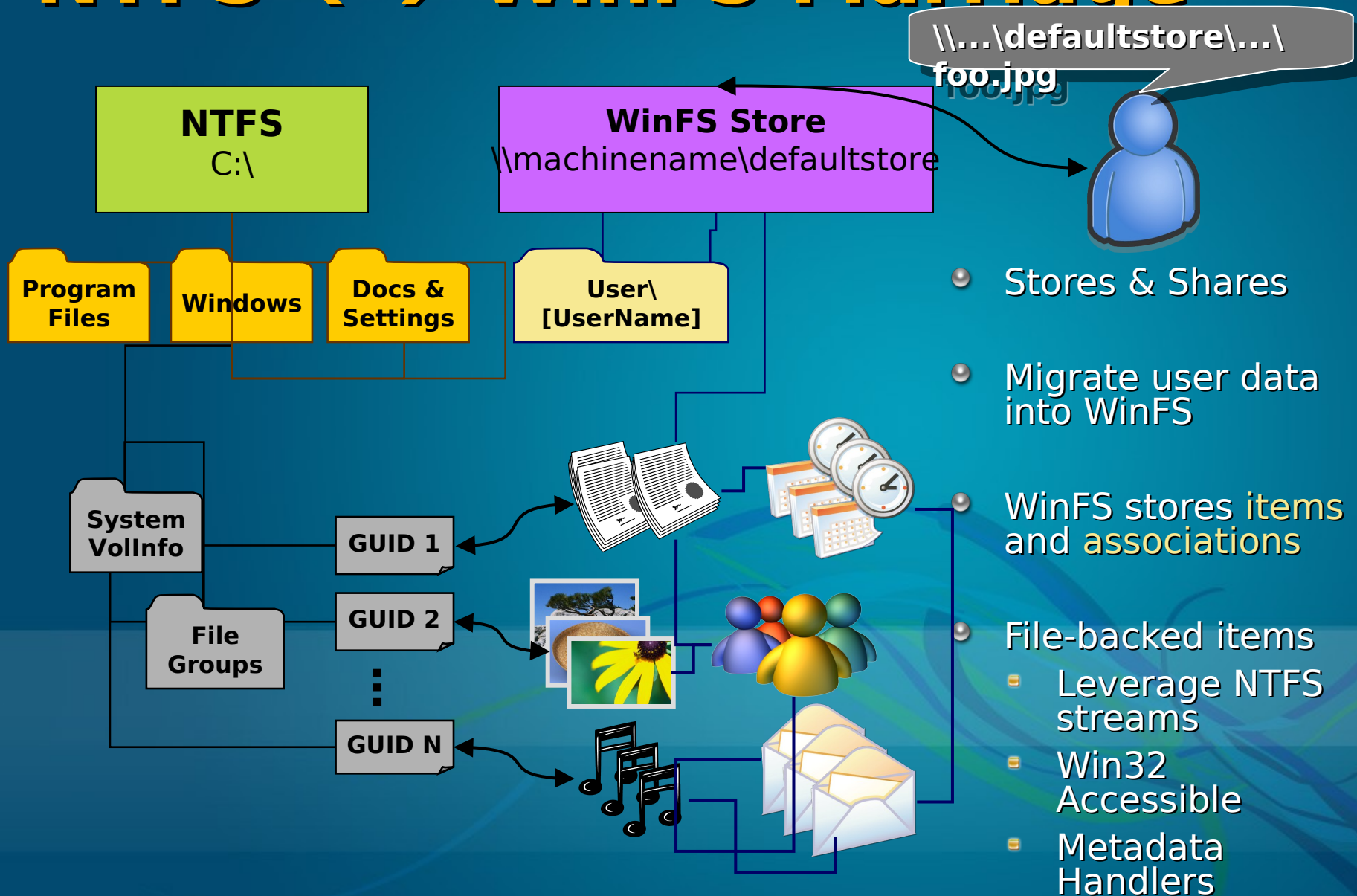
- Common Value Relationships
- Explicitly link items together

## Extensions

Provide ability to add new data to existing item types



# NTFS ↔ WinFS Marriage



Abstract colorful lines in pink, blue, and yellow, flowing from the left side of the slide.

# DEMO

## Value of WinFS: ORGANIZE

**PDC<sup>05</sup>**  
DEVELOPER POWERED

# Windows Types

pictures



annotations



documents



people



music



## Focus on “Everyday Information”

- WinFS will ship with set of pre-defined schemas
- Designed for cross-application sharing
- Extensible model both for adding application data to existing schemas, and creating new schemas

### PIM

- Contacts
- Calendar
- Message
- Tasks
- Events

### InformationWorker

- Documents
- Annotations

### Media

- Audio
- Videos
- Images

e-mail





# Defining And Extending Schema

```
<EntityType Name="Listing" BaseType="WinFS.Item">
  <Property Name="Address" Type="Core.PostalAddress"/>
  <Property Name="PropertyInfo" Type="PropertyInfo"/>
  <Property Name="SchoolInfo" Type="SchoolInfo"/>
  <Property Name="MLSInfo" Type="MLSData"/>
  <Property Name="PriceHistory" Type="Array(PriceEntry)"/>
</EntityType>

<InlineType Name="PriceEntry" BaseType="WinFS.InlineType">
  <Property Name="Price" Type="WinFS.Int32"/>
  <Property Name="Date" Type="WinFS.DateTime"/>
  <Property Name="Comments" Type="WinFS.String" Size="1000"/>
</InlineType>

<EntityExtension Name="ShowingExtension" BaseType="WinFS.ItemExtension"
  ExtendsType="Calendar.Meeting">
  <Property Name="MLSID" Type="WinFS.Int32"/>
</EntityExtension>
```

```
public partial class Listing : Item {
    public MLSData MLSInfo {get; set;}
    public IList<PriceEntry> PriceHistory {get; set;}
    ...
}

public partial class ShowingExtension: Extension<Item> {
    ...
}
```



Developer

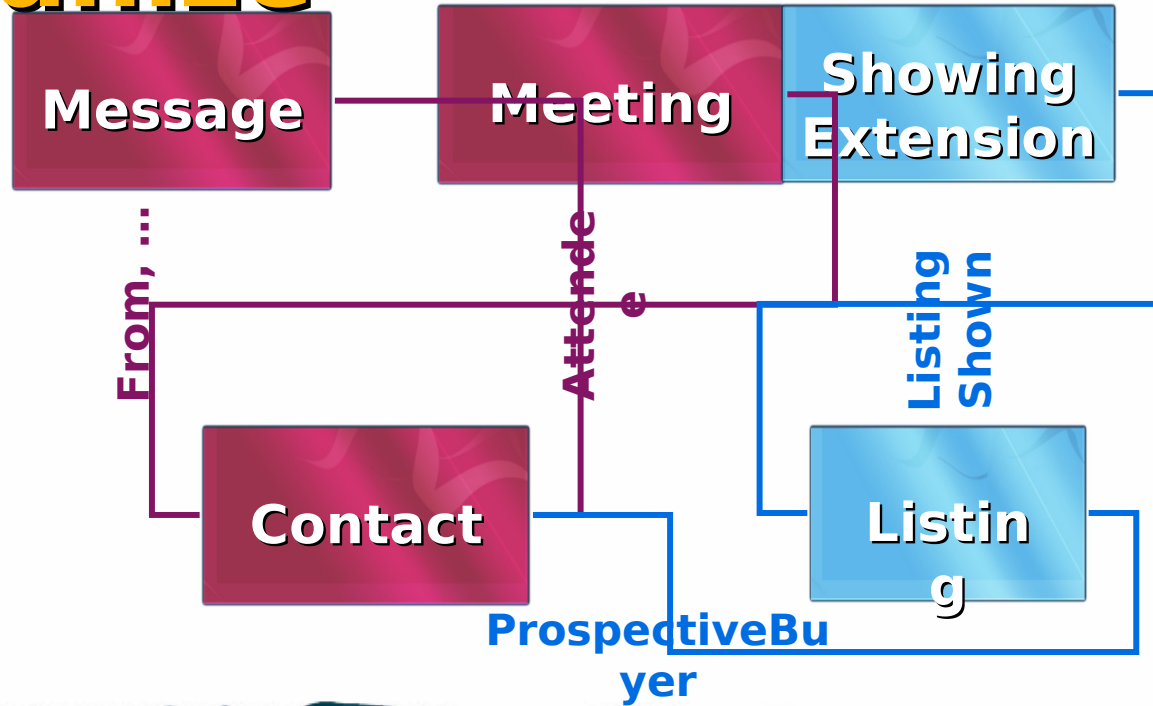
Code  
Generation

Package  
and Deploy

WinFS Store

ItemId	Address	PriceHistory
	Street City State Zip	Price Date Comments
		Price Date Comments
		Price Date Comments

# Using Schemas To “Organize”



Why organize data in a natural model?

1. Data “self-organizes” across applications
2. Rich queries are now possible...

Abstract colorful lines in pink, blue, and yellow, flowing from the left side of the slide.

# DEMO

## Value of WinFS: EXPLORE

**PDC<sup>05</sup>**  
DEVELOPER POWERED

# ADO.NET entities on SQL

```
Imports System.Data.Objects
```

```
...
```

```
' Create Connection
```

```
Dim dc As DataConnection = New  
    DataConnection(myDataConfig)
```

```
' Create Object Context w/ explicit mappings
```

```
Dim amap As IObjectMapping = New  
    ObjectMappingFile(objectMapFile)
```

```
Dim oc AsObjectContext = New  
    ObjectContext(dc, amap)
```

```
' Query for customers with active status
```

```
Dim customers As DataCommand(Of Customer) =  
    oc.CreateCommand(Of Customer)  
    ("SELECT c FROM Customers as c  
    WHERE c.Status = 'Active'");
```

```
' Iterate through results
```

```
For Each customer As Customer In customers  
    Console.WriteLine(customer.LastName)  
Next
```

```
' Add a new customer
```

```
Dim c As Customer = New Customer(id, name)  
oc.Add("Customers", c)  
oc.SaveChanges()
```

1

Can start with provider connection or DataConnection

2

Can specify separate object mapping

3

ObjectContext provides object services on top of provider

4

Typed Canonical Command

5

Typed Results

6

Update through objects

**\* Learn more in:** "WinFS" and ADO.NET: Future Directions for Data Access Scenarios [DAT312]

# ADO.NET entities on WinFS

```
Imports System.Storage
Imports System.Data.Objects
...

' Create WinFS Connection
Dim wc As WinFSCollection = New
    WinFSCollection("\\localhost\\defaultstore")

' Create an Object Context (mappings implicit)
Dim oc AsObjectContext = NewObjectContext(wc)

' Query for contacts named "Smith"
Dim contacts As DataCommand(Of Contact) =
    oc.CreateCommand(Of Contacts)
    ("SELECT c FROM Contacts as c
     WHERE c.LastName ='Smith'")

' Iterate through results
For Each contact As Contact In contacts
    Console.WriteLine(contact.LastName)
Next

' Add a new contact
Dim c As Contact = New Contact(container, id,
    fname, lname)
oc.SaveChanges()
```

1

WinFS is in  
System.Storage

2

WinFSCollection  
specifies connection  
point and has implicit  
mappings

3

Rich queries over  
WinFS schemas

4

WinFS item data model

**\* Learn more in:** "WinFS" Future  
Directions: Building Data Centric  
Applications using Windows  
Presentation Foundation and Windows  
Forms [DAT310]



# Real Estate Example:

*"Listings I showed to people today"*

```
Imports System.Storage
Imports System.Data.Objects
Imports ISV.RealEstate
...

' Query for showings today
Dim showingsToday As DataCommand(Of Meeting) = _
    oc.CreateCommand(Of Meeting)
    ("SELECT m FROM Meetings as m
     WHERE
      m.StartTime > DateTime.Now.Date
      and m.StartTime <= DateTime.Now.Date.AddDays(1)
      and m.Extensions.Get(typeof(ShowingExtension))
        is not null")

' Query for listings shown today
Dim listingsShownToday As DataCommand(Of Listing) = _
    oc.CreateCommand(Of Listing)
    ("SELECT listing
     FROM Listings as listing JOIN @0 as meeting
     WHERE listing.MLSInfo.MLSID ==
      meeting.Extensions
        .Get(typeof(ShowingExtension)).MLSID",
     showingsToday)

' Iterate through results
For Each listing As Listing In listingsShownToday
    Console.WriteLine(listing.MLSInfo.MLSId)
Next
```

1

Import new  
custom schemas

2

showingsToday =  
meetings today that  
have a showing  
extension

3

listingsShownToday =  
join of showingsToday  
with listings

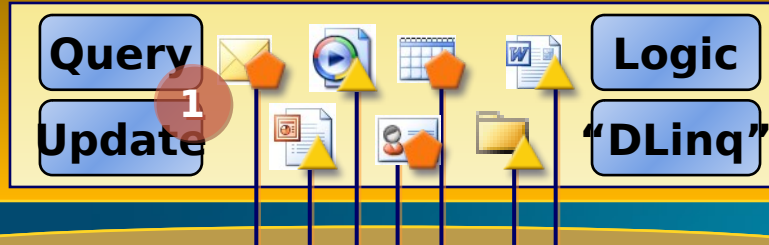


# Value of WinFS: INNOVATE

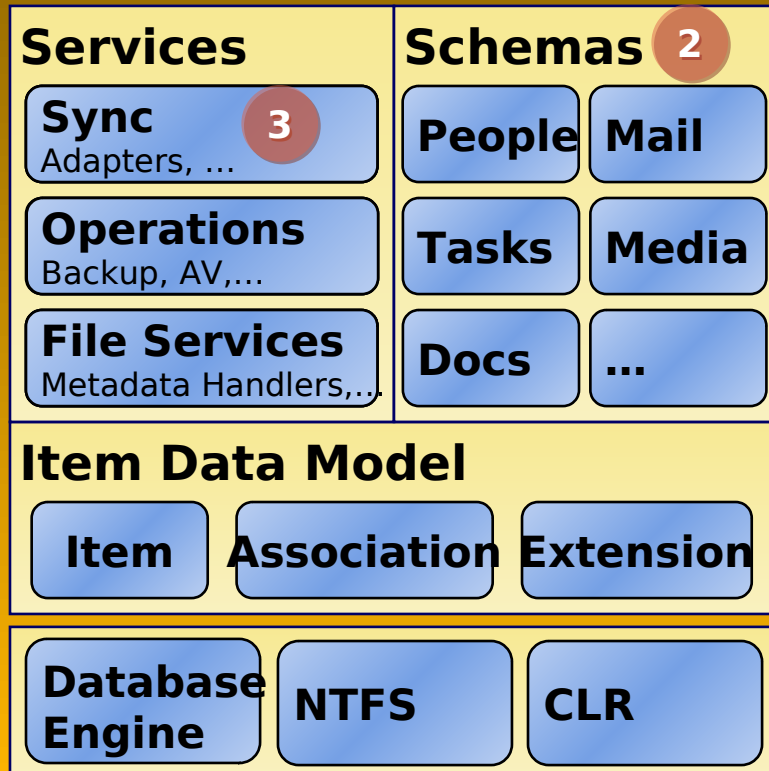
**PDC<sup>05</sup>**  
DEVELOPER POWERED

# WinFS For Developers

## ADO.NET



## WinFS



1

### Leveraging a rich data platform

Using the next-generation ADO.NET API on WinFS to query for data and build great applications, without building your own data store

2

### Building shared data applications

Use schemas to extend and relate Windows types, build your own types, and extend with logic and behaviors

3

### Building smart connected applications

Build sync adapters and metadata handlers to bring your data into WinFS



## ● History and Updates

- Integrated data addresses data challenges of today and the future
- WinFS Beta1 on your DVDs, will deliver out-of-band from Windows Vista

## ● Introducing WinFS

- Relational filesystem with a new Item data model
- Provides services like synchronization, rich APIs, and standard types
- Aligned with next-generation ADO.NET APIs

## ● Value of WinFS

- Unify, Organize, Explore, Innovate
- Platform for you to build new, innovative applications!

# Community Resources

## • At PDC

- For more information, go see
  - DAT209 (again!): Repeated Thurs 515pm
  - DAT310: “WinFS” Future Directions: Building Data Centric Applications using Windows Presentation Foundation (“Avalon”) and Windows Forms (Wed 315pm)
  - DAT312: “WinFS” and ADO.NET: Future Directions for Data Access Scenarios (Wed 5pm)
  - Labs: DAT-HOL07: Getting started with WinFS
  - DAT Track lounge: I’ll be there Thu 1230-330pm
  - Ask the Experts: Thursday night

## • After PDC

- MSDN dev center: <http://msdn.microsoft.com/data/winfs/>
- Channel 9 tag: <http://channel9.msdn.com/tags/WinFS>
- Blog: <http://blogs.msdn.com/winfs>
- Newsgroup: <news://microsoft.public.windows.developer.winfx.winfs>

# ***Microsoft***<sup>®</sup>

*Your potential. Our passion.*<sup>™</sup>

© 2005 Microsoft Corporation. All rights reserved.

This presentation is for informational purposes only. Microsoft makes no warranties, express or implied, in this summary.